



TI-P067-13
CMGT Issue 2

IBV Series C-LF2 Carbon Steel Inverted Bucket Vertical Steam Trap

Description

The IBV series C-LF2 inverted bucket steam trap is manufactured using carbon steel (A350 LF2) for the body and cover; with internal components being made of stainless steel. It is suitable for use with saturated and superheated steam and in high pressure and high temperature applications. The IBV is fully automatic and has been designed in such a way that there is minimal friction from mechanism movement; valve closure is immediate, without any steam loss and the discharge action is positive with no equivocal phases. The standard version will be supplied with bolted support brackets.

On the cover of the IBV there is a $\frac{3}{8}$ " hole, threaded and plugged, to eliminate any water discharge after being hydraulically tested before leaving the factory. This hole can be reopened on site for the customer to perform periodic hydro testing.

Available types

Series C	Carbon steel body and cover	See TI-P067-10
Series C-LF2	Carbon steel body and cover with a material specification of A350 LF2 for low temperature applications down to -46 °C	
Series Z	Alloy steel body and cover	See TI-P067-15

Standards

This steam trap is designed following the ASME VIII Directive and complies with the requirements of the European Pressure Equipment Directive and carries the  mark when so required.

Certification

The product is available with material certification to EN 10204 3.1. **Note:** All certification / inspection requirements must be stated at the time of order placement.

Optional extras

On request the IBV steam trap can be equipped with the following:

An inbuilt stainless steel check valve

Please note that this option is only available for units that have a ΔP maximum differential pressure of 40 bar and above - See the IBV product nomenclature and selection guide on page 12 for clarification.

A Stellite plug and seat.

Sizes and pipe connections

Please note that all standard flanges (as noted below) will be slip-on type. Weld-neck type flanges can be supplied to special order and must be specified at the time of order placement.

$\frac{1}{2}$ ", $\frac{3}{4}$ ", 1", $1\frac{1}{2}$ ", 2" and 3"

Screwed BSP or NPT

Socket weld, according to ASME B 16.11

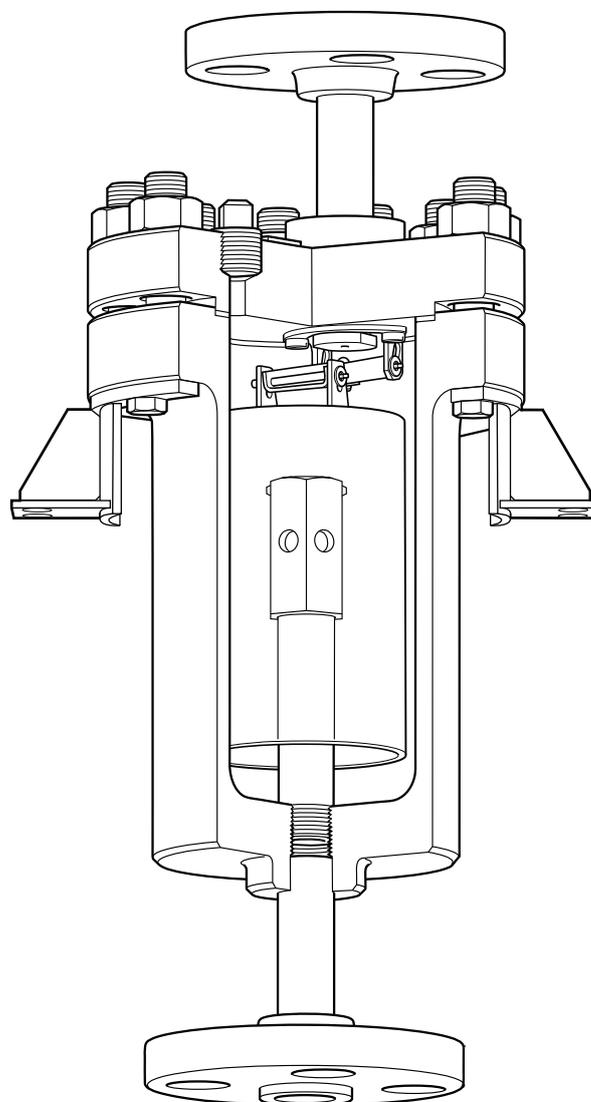
$\frac{1}{2}$ ", $\frac{3}{4}$ ", 1", $1\frac{1}{2}$ ", 2" and 3"

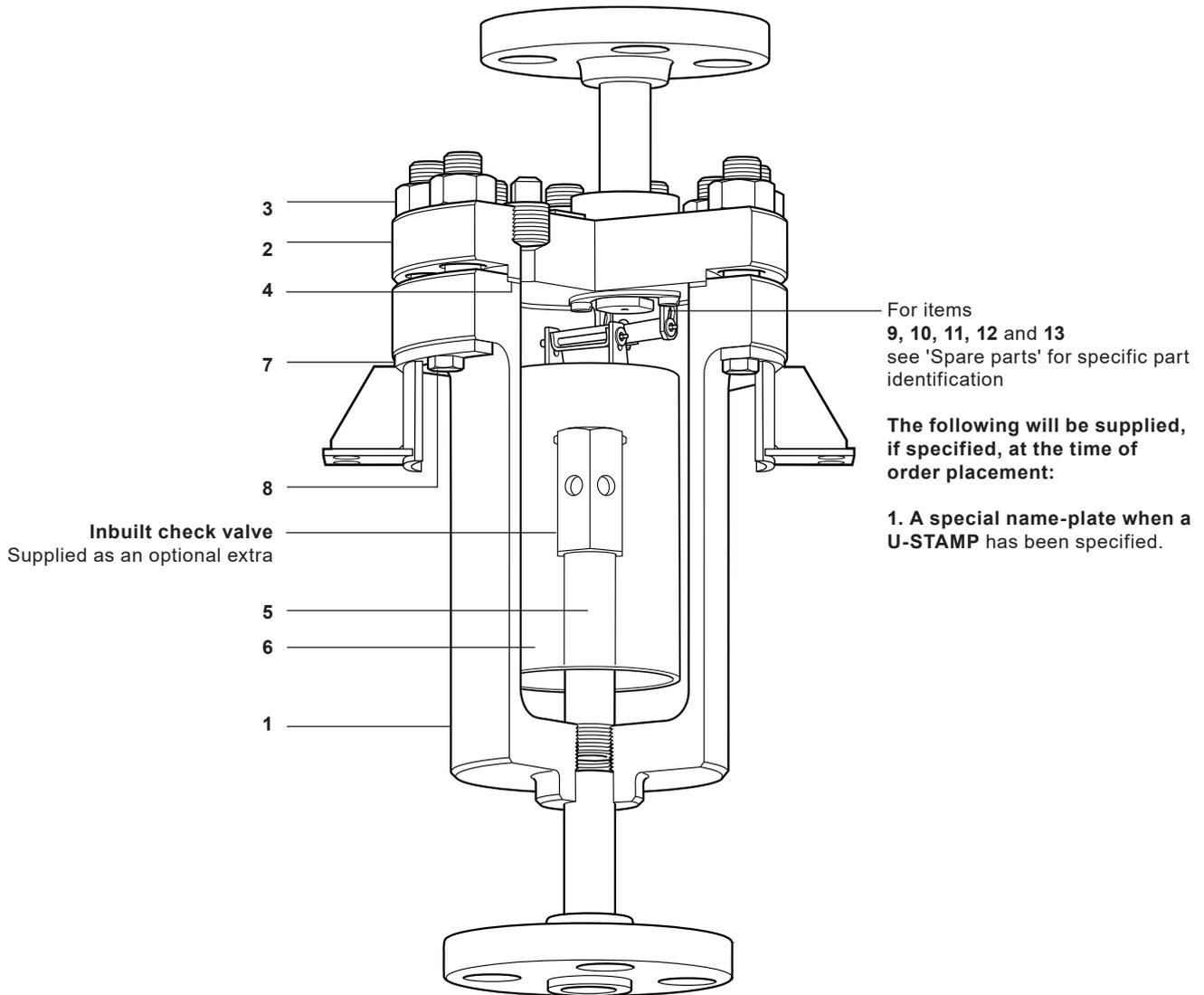
Flanged ASME B 16.5 ASME class 150, 300, 600, 900 and 1500*

DN15, DN20, DN25, DN40, DN50 and DN80

Flanged EN 1092 PN16, PN25, PN40, PN63, PN100 and PN160*

* **Note:** that the flanged ASME class 1500 and EN 1092 PN160 units are limited to a body rating of ASME class 900.

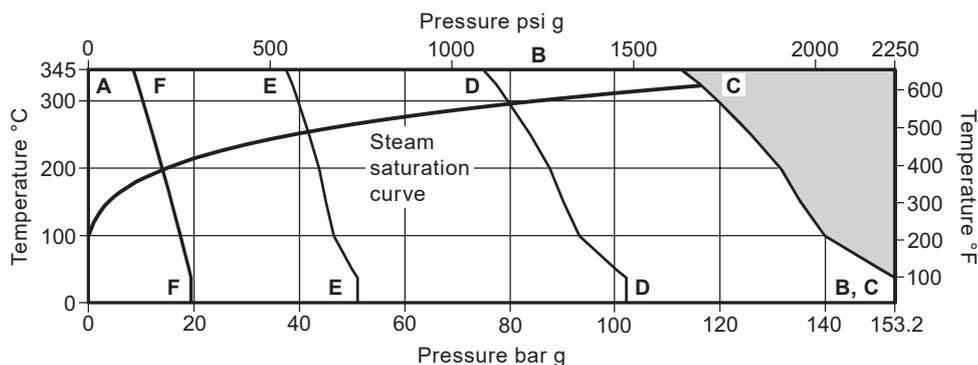




Materials

No.	Part	Material
1	Body	PED ASTM A350 LF2 CL. 1
		U-STAMP ASME SA350 LF2 CL. 1
2	Cover	Carbon steel
		ASTM A350 LF2
		Stud bolts
		ASTM A193 Gr. B8 CL.2
	Nuts	ASTM A194 Gr. 8
3	NACE Version	(External only)
		Stud bolts
		ASTM A479XM-19
	Nuts	ASTM A194 Gr. 8M
4	Cover gasket	Reinforced graphite
5	Channelling pipe	Stainless steel
		A333 Gr. 6
6	Bucket	Stainless steel
		AISI 316
7	Bracket	Carbon steel
		A516 Gr. 6
8	Bracket screw	Stainless steel
		AISI 316
9	Lever pin	Stainless steel
		AISI 316
10	Split pin	Stainless steel
		AISI 316
11	Valve seat	Stainless steel
		400 series
12	Valve head	Stainless steel
		400 series
13	Valve lever	Stainless steel
		AISI 316

Pressure / temperature limits (ISO 6552) - Screwed, Socket weld and Flanged ASME

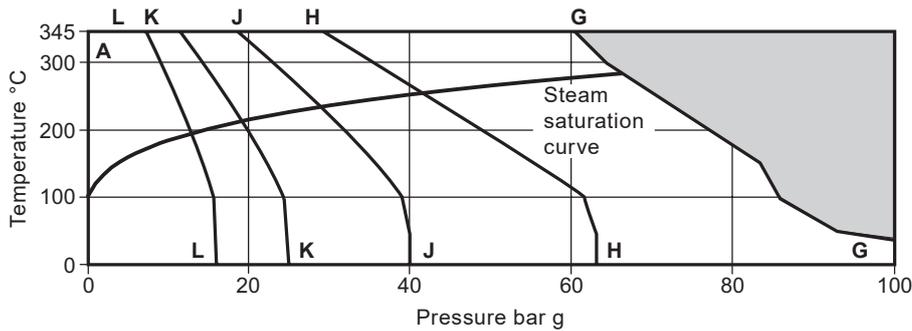


The product **must not** be used in this region or beyond the parameter of the PMA or TMA of the relative end connection.

* Please note that the PMO is limited to the maximum ΔP of the selected IBV.

A-B-B	Screwed and Socket weld	Body design conditions		ASME class 900	
		PMA - Maximum allowable pressure	153.2 bar g @ 38 °C	2222 psi g @ 100 °F	
		TMA - Maximum allowable temperature	345 °C @ 112.7 bar g	653 °F @ 1635 psi g	
		Minimum allowable temperature	-46 °C	-50 °F	
A-C-C	ASME class 900	* PMO - Maximum operating pressure for saturated steam service	116.3 bar g	1687 psi g	
		TMO - Maximum operating temperature	345 °C @ 112.7 bar g	653 °F @ 1635 psi g	
		Minimum operating temperature	0 °C	32 °F	
		Designed for a maximum cold hydraulic test pressure of:	229.8 bar g	3333 psi g	
A-D-D	ASME class 600	Body design conditions		ASME class 600	
		PMA - Maximum allowable pressure	100.2 bar g @ 38 °C	1453 psi g @ 100 °F	
		TMA - Maximum allowable temperature	345 °C @ 75.1 bar g	653 °F @ 1089 psi g	
		Minimum allowable temperature	-46 °C	-50 °F	
		* PMO - Maximum operating pressure for saturated steam service	79.9 bar g	1159 psi g	
		TMO - Maximum operating temperature	345 °C @ 75.1 bar g	653 °F @ 1089 psi g	
		Minimum operating temperature	0 °C	32 °F	
Designed for a maximum cold hydraulic test pressure of:	150 bar g	2175 psi g			
A-E-E	ASME class 300	Body design conditions		ASME class 300	
		PMA - Maximum allowable pressure	51.1 bar g @ 38 °C	741 psi g @ 100 °F	
		TMA - Maximum allowable temperature	345 °C @ 37.6 bar g	653 °F @ 545 psi g	
		Minimum allowable temperature	-46 °C	-50 °F	
		* PMO - Maximum operating pressure for saturated steam service	41.7 bar g	605 psi g	
		TMO - Maximum operating temperature	345 °C @ 37.6 bar g	653 °F @ 545 psi g	
		Minimum operating temperature	0 °C	32 °F	
Designed for a maximum cold hydraulic test pressure of:	76.6 bar g	1111 psi g			
A-F-F	ASME class 150	Body design conditions		ASME class 150	
		PMA - Maximum allowable pressure	19.6 bar g @ 38 °C	284 psi g @ 100 °F	
		TMA - Maximum allowable temperature	345 °C @ 8.4 bar g	653 °F @ 122 psi g	
		Minimum allowable temperature	-46 °C	-50 °F	
		* PMO - Maximum operating pressure for saturated steam service	14 bar g	203 psi g	
		TMO - Maximum operating temperature	345 °C @ 8.4 bar g	653 °F @ 122 psi g	
		Minimum operating temperature	0 °C	32 °F	
Designed for a maximum cold hydraulic test pressure of:	29.4 bar g	426 psi g			

Pressure / temperature limits (ISO 6552) - Flanged DIN



The product **must not** be used in this region or beyond the parameter of the PMA or TMA of the relative end connection.

* **Please note** that the PMO is limited to the maximum ΔP of the selected IBV.

A-G-G	PN100	Body design conditions	PN100
		PMA - Maximum allowable pressure	100 bar g @ 38 °C
		TMA - Maximum allowable temperature	345 °C @ 60.4 bar g
		Minimum allowable temperature	-46 °C
		* PMO - Maximum operating pressure for saturated steam service	66 bar g
		TMO - Maximum operating temperature	345 °C @ 60.4 bar g
		Minimum operating temperature	0 °C
Designed for a maximum cold hydraulic test pressure of:		143 bar g	
A-H-H	PN63	Body design conditions	PN63
		PMA - Maximum allowable pressure	63 bar g @ 38 °C
		TMA - Maximum allowable temperature	345 °C @ 29.4 bar g
		Minimum allowable temperature	-46 °C
		* PMO - Maximum operating pressure for saturated steam service	44 bar g
		TMO - Maximum operating temperature	345 °C @ 29.4 bar g
		Minimum operating temperature	0 °C
Designed for a maximum cold hydraulic test pressure of:		90 bar g	
A-J-J	PN40	Body design conditions	PN40
		PMA - Maximum allowable pressure	40 bar g @ 38 °C
		TMA - Maximum allowable temperature	345 °C @ 18.6 bar g
		Minimum allowable temperature	-46 °C
		* PMO - Maximum operating pressure for saturated steam service	29 bar g
		TMO - Maximum operating temperature	345 °C @ 18.6 bar g
		Minimum operating temperature	0 °C
Designed for a maximum cold hydraulic test pressure of:		57.2 bar g	
A-K-K	PN25	Body design conditions	PN25
		PMA - Maximum allowable pressure	25 bar g @ 38 °C
		TMA - Maximum allowable temperature	345 °C @ 11.6 bar g
		Minimum allowable temperature	-46 °C
		* PMO - Maximum operating pressure for saturated steam service	19 bar g
		TMO - Maximum operating temperature	345 °C @ 11.6 bar g
		Minimum operating temperature	0 °C
Designed for a maximum cold hydraulic test pressure of:		35.7 bar g	
A-L-L	PN16	Body design conditions	PN16
		PMA - Maximum allowable pressure	16 bar g @ 38 °C
		TMA - Maximum allowable temperature	345 °C @ 7.4 bar g
		Minimum allowable temperature	-46 °C
		* PMO - Maximum operating pressure for saturated steam service	12 bar g
		TMO - Maximum operating temperature	345 °C @ 7.4 bar g
		Minimum operating temperature	0 °C
Designed for a maximum cold hydraulic test pressure of:		22.8 bar g	

Capacities - DN15

Note: IBV inverted bucket steam traps should be selected for use at the most appropriate working differential pressure and not on the basis of load.

Condensate discharge capacities (kg/h) - The discharge capacities in the table are referring to the operating temperature of the saturated steam and the PMO of the steam trap shall be the relevant ΔP maximum differential pressure of each specific model.

For optimum trap selection you need to know the following criteria:

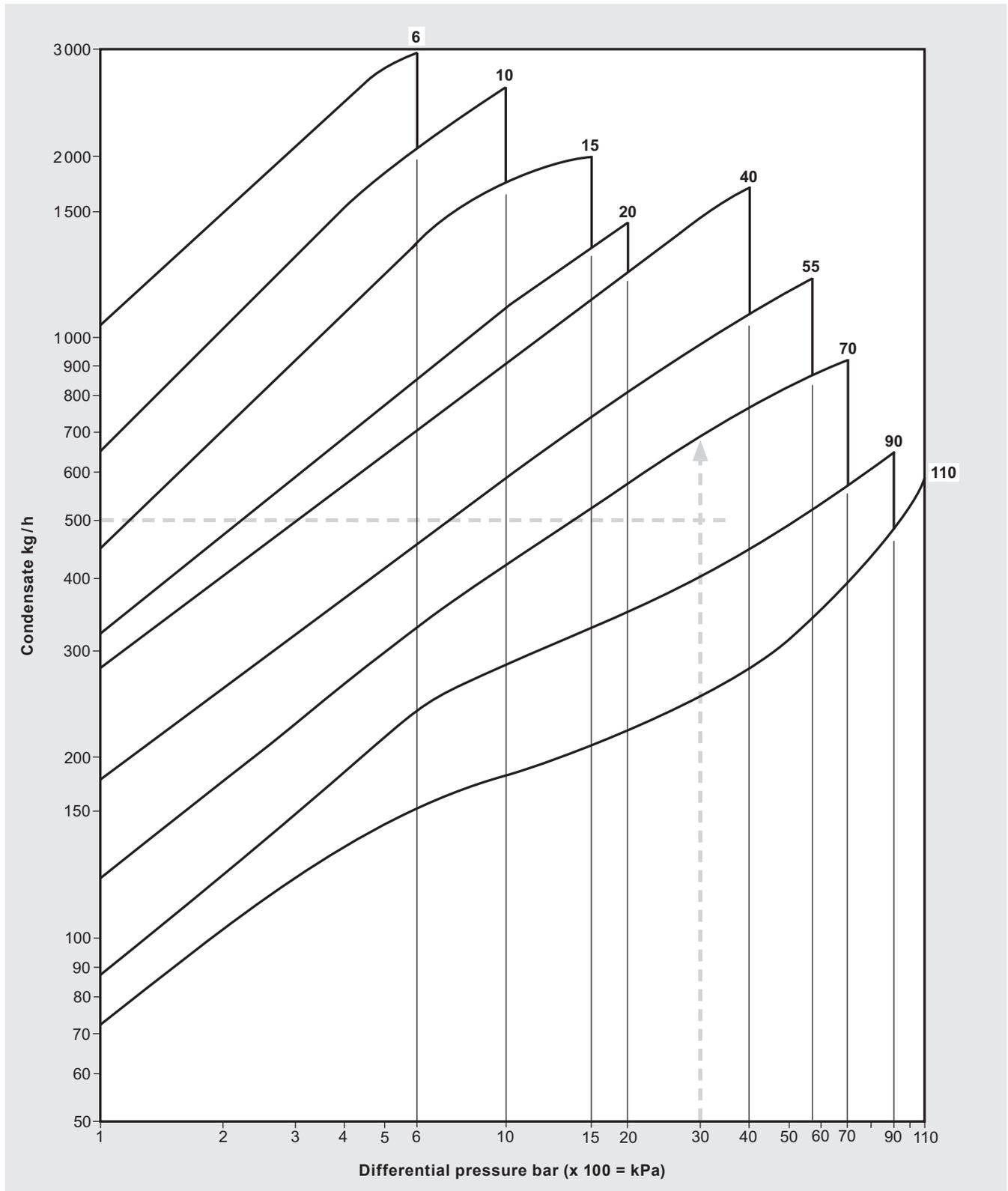
- The hourly amount of condensate to be discharged, inclusive of the safety factor: x1.5 for continuous use, x2 to x3 for intermittent use.
- The effective differential pressure.

Working example:

Condensate discharge = 500 kg/h
 Effective differential pressure = 30 bar
 Upstream pressure = 45 bar g
 Backpressure = 15 bar g

The unit of choice would have a ΔP max. differential pressure of **70 bar** which is greater than the upstream pressure.

For full product selection and nomenclature follow the guide on page 12.



Capacities - DN20

Note: IBV inverted bucket steam traps should be selected for use at the most appropriate working differential pressure and not on the basis of load.

Condensate discharge capacities (kg/h) - The discharge capacities in the table are referring to the operating temperature of the saturated steam and the PMO of the steam trap shall be the relevant ΔP maximum differential pressure of each specific model.

For optimum trap selection you need to know the following criteria:

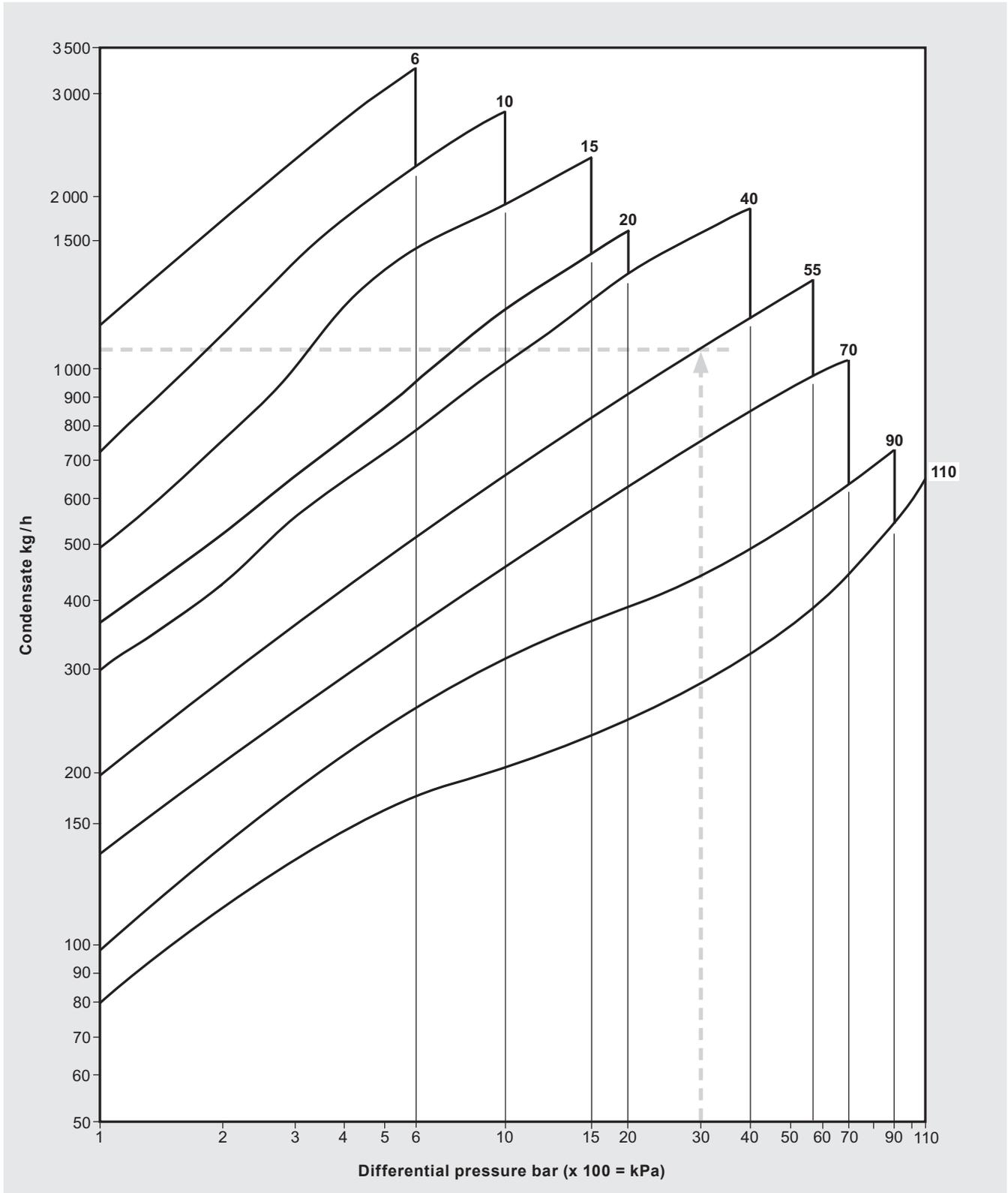
- The hourly amount of condensate to be discharged, inclusive of the safety factor: x 1.5 for continuous use, x 2 to x 3 for intermittent use.
- The effective differential pressure.

Working example:

Condensate discharge = 1050 kg/h
 Effective differential pressure = 30 bar
 Upstream pressure = 45 bar g
 Backpressure = 15 bar g

The unit of choice would have a ΔP max. differential pressure of **55 bar** which is greater than the upstream pressure.

For full product selection and nomenclature follow the guide on page 12.



Capacities - DN25

Note: IBV inverted bucket steam traps should be selected for use at the most appropriate working differential pressure and not on the basis of load.

Condensate discharge capacities (kg/h) - The discharge capacities in the table are referring to the operating temperature of the saturated steam and the PMO of the steam trap shall be the relevant ΔP maximum differential pressure of each specific model.

For optimum trap selection you need to know the following criteria:

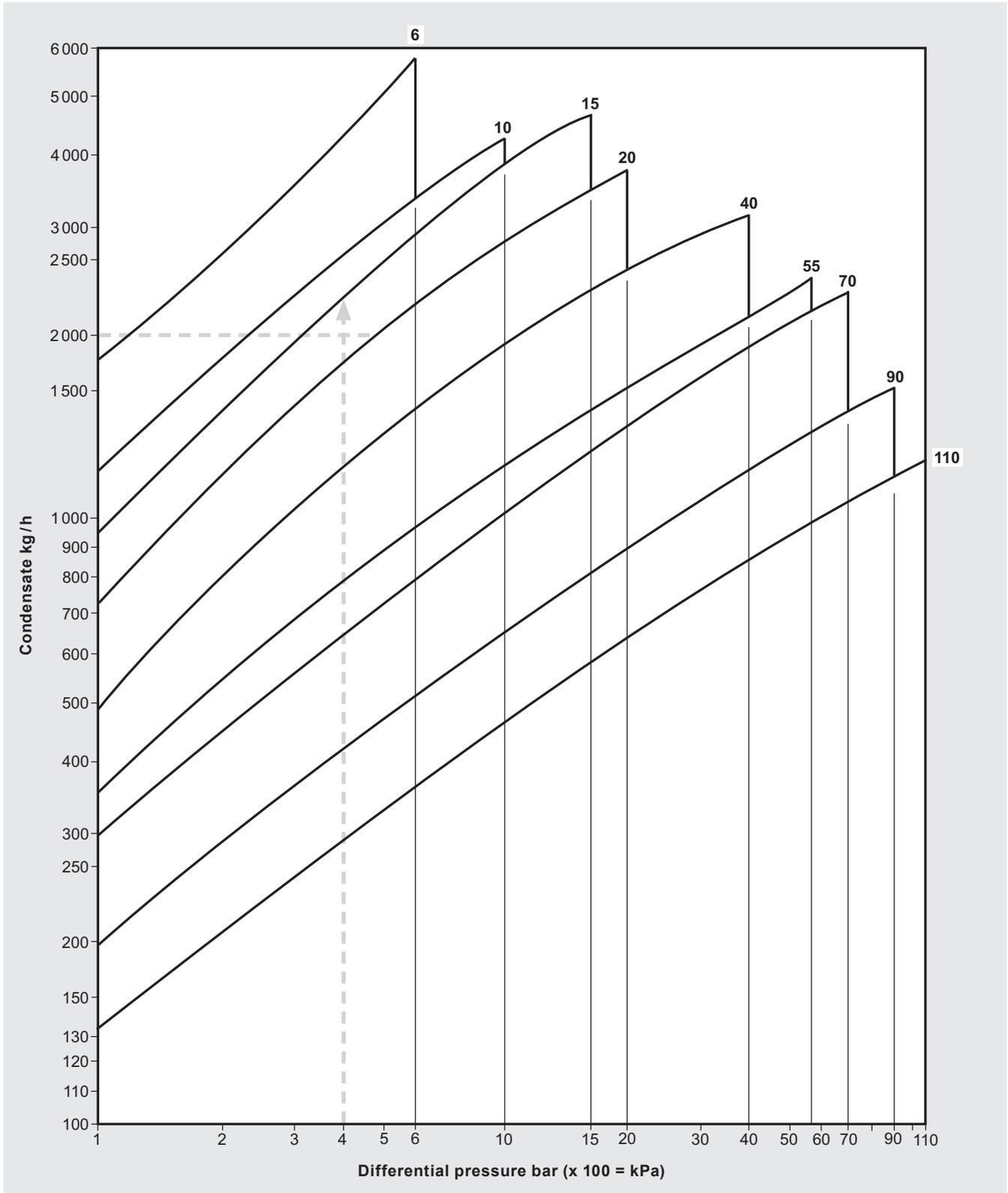
- The hourly amount of condensate to be discharged, inclusive of the safety factor:
x 1.5 for continuous use, x 2 to x 3 for intermittent use.
- The effective differential pressure.

Working example:

Condensate discharge = 2000 kg/h
 Effective differential pressure = 4 bar
 Upstream pressure = 5 bar g
 Backpressure = 1 bar g

The unit of choice would have a ΔP max. differential pressure of **15 bar** which is greater than the upstream pressure.

For full product selection and nomenclature follow the guide on page 12.



Capacities - DN40

Note: IBV inverted bucket steam traps should be selected for use at the most appropriate working differential pressure and not on the basis of load.

Condensate discharge capacities (kg/h) - The discharge capacities in the table are referring to the operating temperature of the saturated steam and the PMO of the steam trap shall be the relevant ΔP maximum differential pressure of each specific model.

For optimum trap selection you need to know the following criteria:

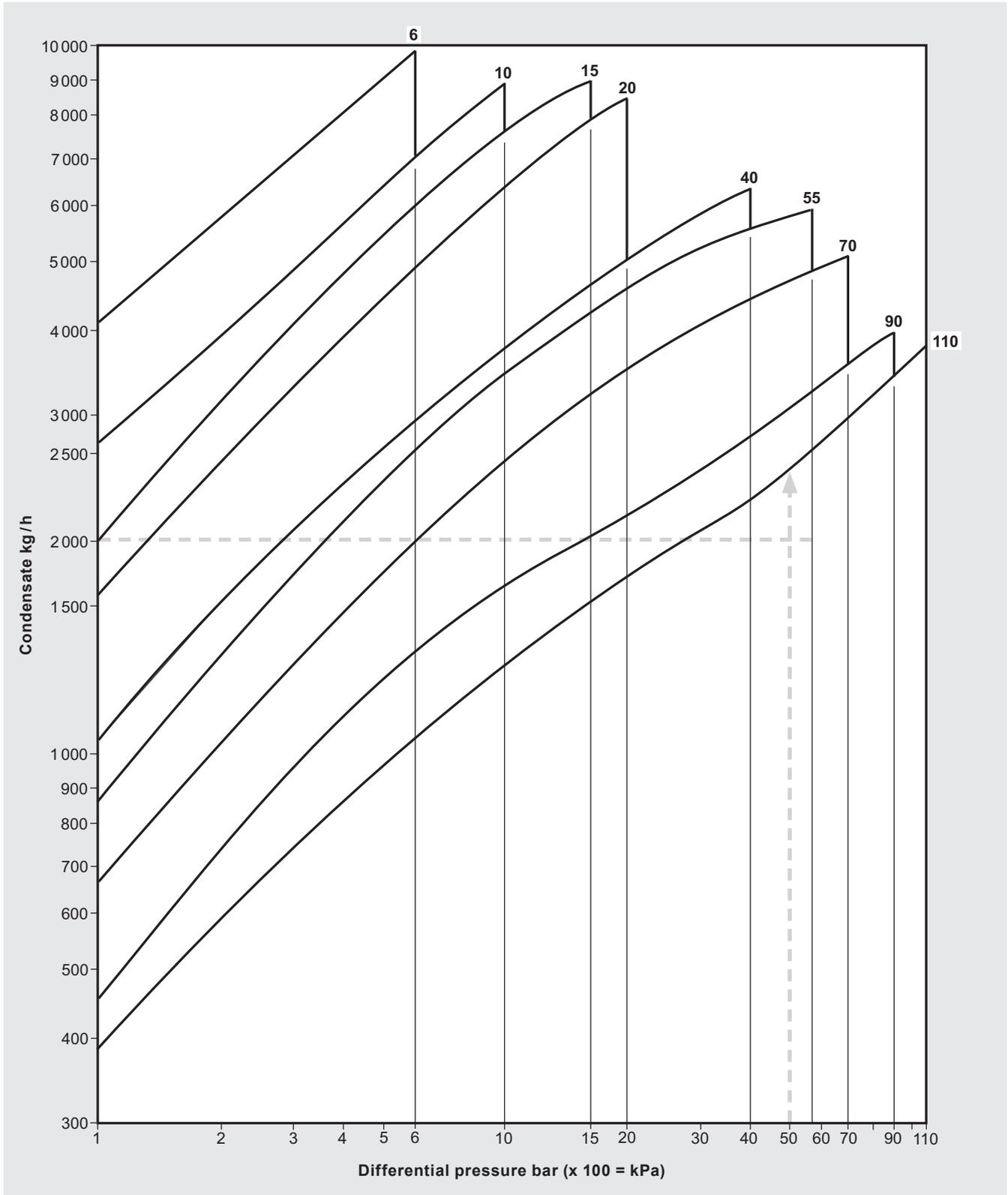
- The hourly amount of condensate to be discharged, inclusive of the safety factor: x 1.5 for continuous use, x 2 to x 3 for intermittent use.
- The effective differential pressure.

Working example:

Condensate discharge = 2000 kg/h
 Effective differential pressure = 50 bar
 Upstream pressure = 75 bar g
 Backpressure = 25 bar g

The unit of choice would have a ΔP max. differential pressure of **110 bar** which is greater than the upstream pressure.

For full product selection and nomenclature follow the guide on page 12.



Capacities - DN50

Note: IBV inverted bucket steam traps should be selected for use at the most appropriate working differential pressure and not on the basis of load.

Condensate discharge capacities (kg/h) - The discharge capacities in the table are referring to the operating temperature of the saturated steam and the PMO of the steam trap shall be the relevant ΔP maximum differential pressure of each specific model.

For optimum trap selection you need to know the following criteria:

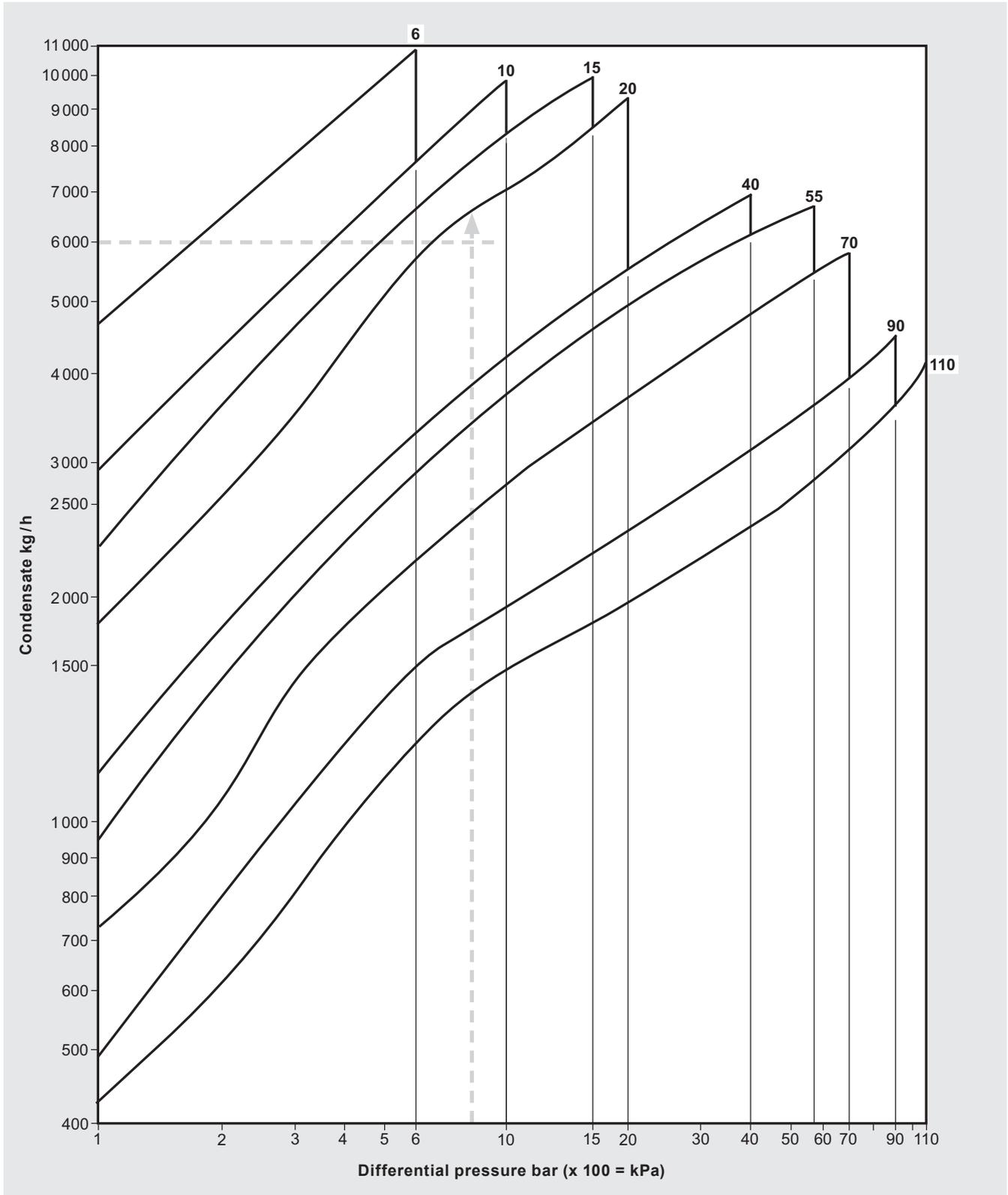
- The hourly amount of condensate to be discharged, inclusive of the safety factor: x 1.5 for continuous use, x 2 to x 3 for intermittent use.
- The effective differential pressure.

Working example:

Condensate discharge = 6000 kg/h
 Effective differential pressure = 8 bar
 Upstream pressure = 10 bar g
 Backpressure = 2 bar g

The unit of choice would have a ΔP max. differential pressure of **20 bar** which is greater than the upstream pressure.

For full product selection and nomenclature follow the guide on page 12.



Capacities - DN80

Note: IBV inverted bucket steam traps should be selected for use at the most appropriate working differential pressure and not on the basis of load.

Condensate discharge capacities (kg/h) - The discharge capacities in the table are referring to the operating temperature of the saturated steam and the PMO of the steam trap shall be the relevant ΔP maximum differential pressure of each specific model.

For optimum trap selection you need to know the following criteria:

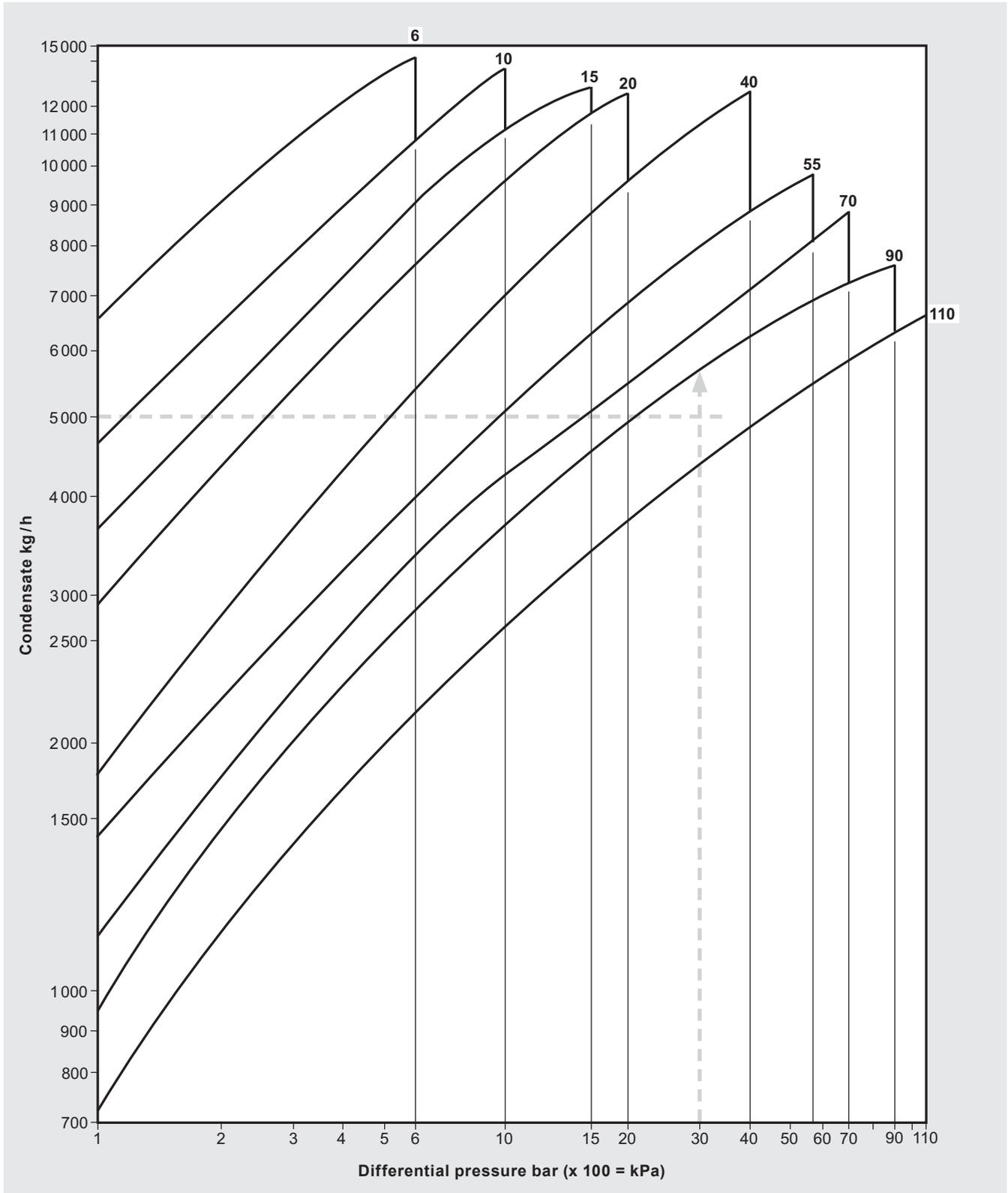
- The hourly amount of condensate to be discharged, inclusive of the safety factor: x1.5 for continuous use, x2 to x3 for intermittent use.
- The effective differential pressure.

Working example:

Condensate discharge = 5000 kg/h
 Effective differential pressure = 30 bar
 Upstream pressure = 55 bar g
 Backpressure = 25 bar g

The unit of choice would have a ΔP max. differential pressure of **90 bar** which is greater than the upstream pressure.

For full product selection and nomenclature follow the guide on page 12.

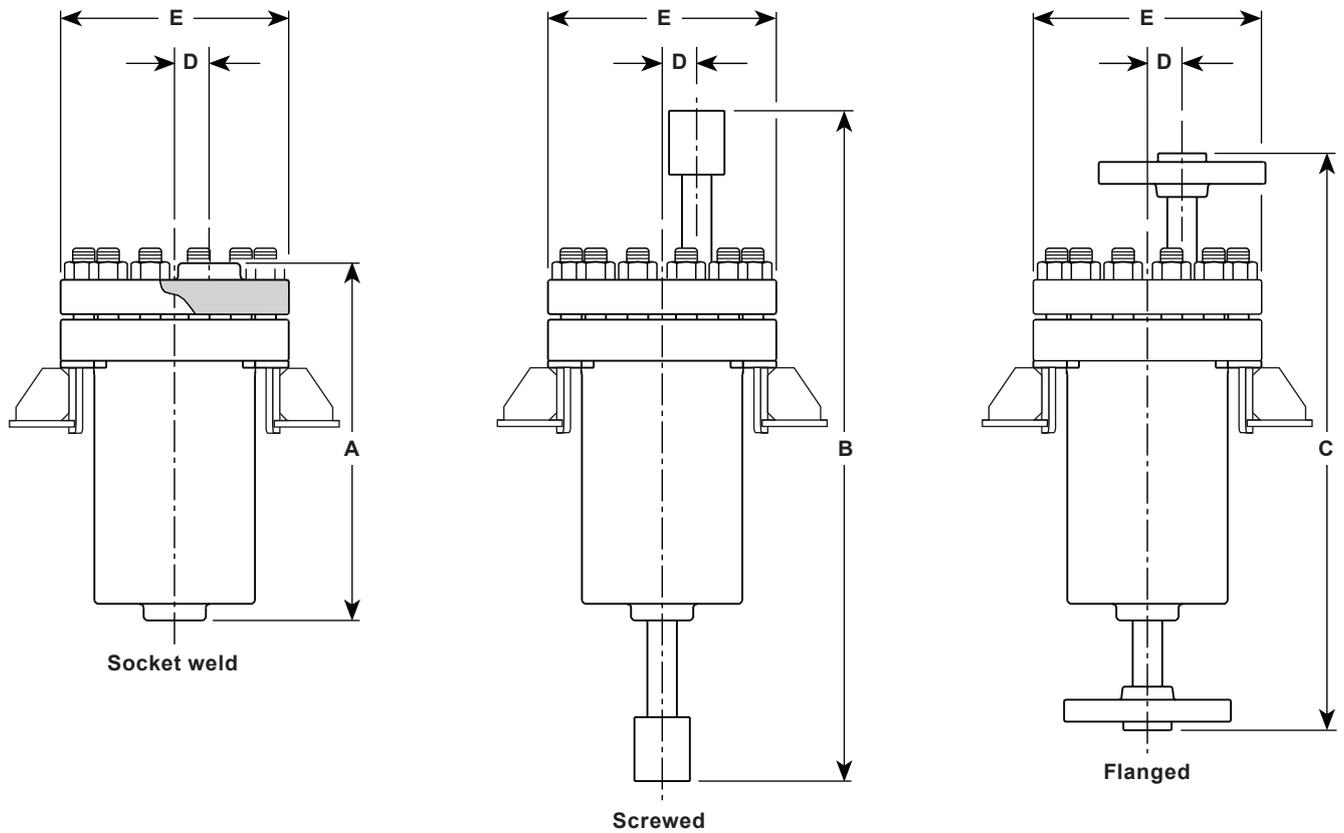


Dimensions/weights (approximate) in mm and kg

IBV size	Dimensions					Weights													
	A	B	C	D	E	BSP + NPT	Socket weld	Flanged ASME class:					Flanged EN 1092:						
								150	300	600	900	1500	PN16	PN25	PN40	PN63	PN100	PN160	
DN15 ½"	260	488	420	25	165	20	18	20	20	20	22	22	20	20	20	20	22	22	
DN20 ¾"	260	488	420	25	165	26	24	26	28	28	30	30	28	28	28	28	30	30	
DN25 1"	345	616	530	40	210	42	39	42	44	44	48	48	42	42	42	42	46	46	
DN40 1½"	411	774	650	39	265	68	65	70	72	72	78	78	70	70	70	70	74	74	
DN50 2"	411	782	650	39	265	68	65	72	74	76	88	88	72	72	72	74	78	78	
DN80 3"	532	1026	850	36	305	125	120	132	136	138	152	162	130	130	130	134	138	142	

The following will be supplied, if specified, at the time of order placement:

1. A special name-plate when a **U-STAMP** has been specified.



IBV product nomenclature and selection guide:

Please note that other units are available on request to suit the specifics of a particular process application.

Series	C-LF2 = Carbon steel	C
PMO @ Saturated steam temperature for the body rating	Carbon steel 116 bar g = ASME class 900 body	116
ΔP maximum differential pressure	ΔP = 6, 10, 15, 20, 40, 55, 70, 90, 110 bar	110
Size	= ½", ¾", 1", 1½", 2", 3" or DN15, DN20, DN25, DN40, DN50, DN80	3"
Screwed	= BSP or NPT	ASME class 300
Connections Socket weld	= According to ASME B 16.11	
Flanged	ASME = ASME class 150, 300, 600, 900, 1500 EN 1092 = PN16, PN25, PN40, PN63, PN100, PN160	
Optional extras	Blank = Standard NACE = NACE compliancy CV = Check valve CV = Please note that this option is only available for units that have a ΔP maximum differential pressure of 40 bar and above - See above.	

IBV product selection example: IBV - C-LF2 - 116 - 110 - 3" - ASME class 300 -

How to order

1 off Spirax Sarco IBV-C-LF2-116-110-3"-Flanged ASME class 300 inverted bucket vertical steam trap having a carbon steel body and cover with stainless steel internals

Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions supplied with the product.

Installation note:

The trap must be installed below the drain point with the body upright in a vertical position, the cover at the top and the inlet connection at the bottom; this orientation will ensure that the bucket mechanism will rise and fall vertically without any friction. It is recommended that a strainer is installed upstream of the IBV to protect it from contamination. To permit safe inspection for cleaning or maintenance purpose it is again recommended that suitable shut-off valves are installed upstream and downstream of the IBV application.

It needs to be appreciated that there is blast discharge with this device, consequently the downstream accessories, if any, should be installed at a minimum distance of 1 m from the IBV.

Disposal

This product is recyclable. No ecological hazard is anticipated with the disposal of this product providing due care is taken.

Spare parts

The spare parts available are shown in heavy outline. Parts drawn in a grey line are not supplied as spares.

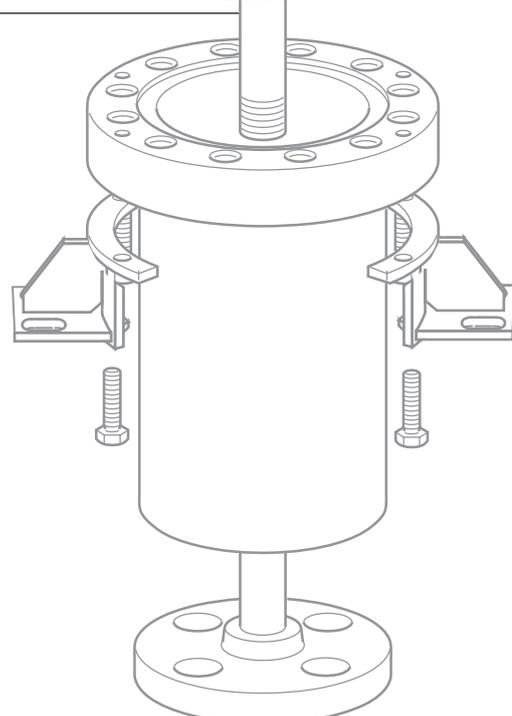
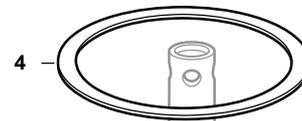
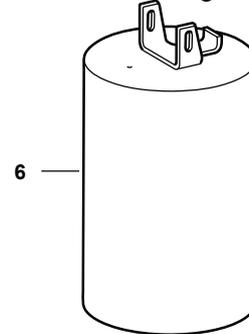
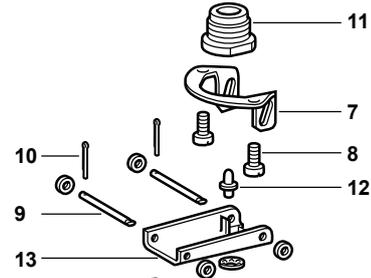
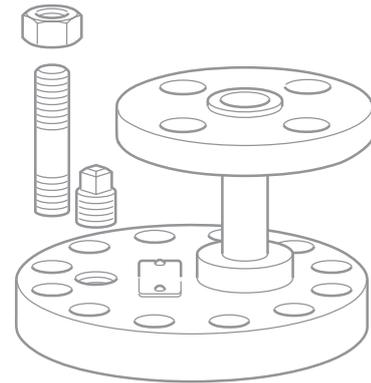
Available spares

Valve assembly	4, 7, 8, 9, 10, 11, 12, 13
Bucket assembly	4, 6, 9, 10
Cover gasket	(packet of 3) 4

How to order spares

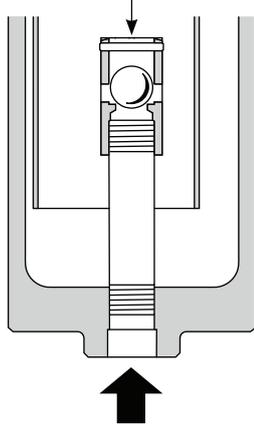
Always order spares by using the description given in the column headed 'Available spares' and state the type of trap, pressure rating and size and type of the connections.

Example: 1 - Valve assembly for a Spirax Sarco IBV - C-LF2 - 116 - 110 - 3" - Flanged ASME class 300 inverted bucket vertical steam trap.



Optional extra

Inbuilt stainless steel check valve



Please note that this option is only available for units that have a DP maximum differential pressure of 40 bar and above - See the IBV product nomenclature and selection guide on page 12 for clarification.